

# ***CONTEXT DIVERSITY: A NEW PARADIGM FOR EXPLAINING THE ACHIEVEMENT GAP AMONG UNDERREPRESENTED POPULATIONS IN STEM DISCIPLINES***

**Roberto A. Ibarra**

**Emeritus Professor of Sociology**

**University of New Mexico**

# **A CRITICAL QUESTION ABOUT DIVERSITY IN EDUCATION IN THE U.S. TODAY:**

**WHY, DESPITE LONG-TERM EFFORTS  
BY AFFIRMATIVE ACTION PROGRAMS,  
DO MANY SEGMENTS OF THE  
NATIONAL POPULATION REMAIN  
GROSSLY UNDERREPRESENTED  
ESPECIALLY IN SCIENCE, TECHNOLOGY,  
ENGINEERING AND MATH (STEM)?  
THE PROBLEM INVOLVES THE  
ACADEMIC ACHIEVEMENT GAP**

# REASSESSING THE PROBLEM: THE ACHIEVEMENT GAP

**Bowen & Bok – The Shape of the River (1998)**  
demonstrated Affirmative Action works but even accounting for all variables, gaps in academic performance among various groups still exist.

- African Americans ranked in the 23rd , Hispanics ranked in 36<sup>th</sup> and majority students ranked in the 53rd percentile in their graduating class.
- But they did find social/cultural factors that reduce the gaps - **people-oriented relationships, family/community engagement, supportive psychological environments, working in groups, collaborative learning environments, etc.**

# THE PROBLEM LIES IN THE ORIGINS OF ACADEMIC CULTURE

- The context of Higher education in the U.S. is locked into a centuries-old **German research institute model** imported from Europe and clamped on a British colonial college system established to educate elite white males.
- The **predominance of a particular and preferred learning environment** tends to exclude all the others, and thus **defines the cultural context** of higher education today,
- The outcome is not only a Euro - centric learning community, but also **a hidden dimension of cultural context** that has been an invisible element of diversity ignored until now.

# THE EMERGING MULTICONTEXT WORLD

In the 1960's, anthropologist Edward T. Hall identified a variety of national origin cultures that exhibited learned preferences or Cultural Contexts that influence how one interacts and associates with others, uses living space, perceives concepts of time, processes information, responds to various teaching and learning styles, performs academically or in the workplace, and includes many other cognitive factors that were imprinted on them in childhood by family and community and continue to help shape their world view throughout their lives.

# THE EMERGING MULTICONTEXT WORLD

## DEFINITION OF “CULTURAL CONTEXT”

Hall defined it as inter-cultural communication based on observations of interpersonal transactions across a wide variety of cultural interfaces. That transaction takes account of how information is handled and how cultural messages are transmitted. Cultural Context translates patterns of behavior into meaning – why do people do what they do and how that affects everything around us both consciously and unconsciously. This is the hidden dimension of Cultural Context.

# THE EMERGING MULTICONTEXT WORLD

Using a binary model, Hall identified some populations, mainly Northern European cultures, such as English, German, Swiss, and Scandinavian people, as Low Context (LC) cultures because they required little contextualization to communicate, interact and interpret the world around them.

# THE EMERGING MULTICONTEXT WORLD

Hall also identified some populations, that included Asians, Arabs, people from other Middle Eastern and Mediterranean-based countries, Africans, Latin Americans, and especially North American Indian groups as High Context (HC) cultures because they required more social and cultural contextualization to communicate, interact and interpret the world around them.



# THE EMERGING MULTICONTEXT WORLD

US populations are varied and still exhibit, to varying degrees, the low or high context imprinting of their ethnic heritage. Although High context populations are increasing in the United States today, mainstream “American culture” and core values are primarily low context. North American men are generally, but not always, found to be more Low Context than North American women. But this too, may be changing.

# THE EMERGING MULTICONTEXT WORLD

Late 1990's research on academically successful Latino/as in grad school and beyond, revised Hall's cultural context model.

- ❖ Diverse populations in U.S. higher education are not necessarily predominantly HC nor LC but are instead Multicontextual - a learned ability to survive in LC academic culture while maintaining HC characteristics in other aspects of life.

# THE EMERGING MULTICONTEXT WORLD

❖ Since WWII, the GI Bill opened doors to a variety of populations including those with different religious faiths, **women and underrepresented groups who tended to bring Multicontextual experiences** that are quite different, and even at odds with the cultural context of academe and even many workplace environments. These individuals tended to under-perform academically or possibly drop out, but they also have had an impact on changing the academic cultures in many institutions.

# THE EMERGING MULTICONTEXT WORLD

- ❖ Although Hall's cultural context model was never applied to examine organizational cultures in the past, applying the Multicontext model today reveals that higher education is predominantly a LC culture derived from the 19<sup>th</sup> century German research institute model that grounded graduate and professional training over the last century. The resulting conflict between LC academic culture and HC cultural preferences causes the dissonance we note among underrepresented groups.

# CLUES ABOUT HOW TO INCREASE DIVERSITY IN STEM EMERGED IN 1970s WITH URI TREISMAN'S MATHEMATICS WORKSHOP SHOWING GROUP STUDY INCREASED ACADEMIC SUCCESS AMONG MINORITY STUDENTS. THE REASON WAS NEVER UNDERSTOOD.

8 UME TRENDS March 1989

## Mathematics Workshop Revamped

*Uri Treisman*

This fall, Leon Henkin, T. Y. Lam, and I embarked on a daunting task: the redesign of the Mathematics Workshop, which for more than a decade has been an extraordinarily effective program for helping Berkeley's minority students to excel in freshman calculus. This reconstruction work takes place just as the program is gaining national recognition. Approximately fifty colleges and universities throughout the United States are currently engaged in developing adaptations of the Workshop to meet the special needs of their own students.

### Popular Misconceptions

The ideas on which the original Workshop Program was based grew out of a series of investigations that I carried out in 1974 and 1975 into the difficulties experienced by many black students in our first-term calculus course. In a nutshell, after interviewing many of our black

calculus students and observing them at work on their mathematics assignments, I was forced to call into question what was then the conventional wisdom about the causes of these students' failure. I did not find that they lacked either drive or motivation, nor did I find that their calculus grades correlated with their high school grade point averages, SAT scores, or for that matter, family incomes.

I discovered that many black students on the Berkeley campus had no mechanism for learning what was required to succeed in their university-level mathematics courses. Unlike many of their Asian counterparts, who typically spent some of their time studying in small groups, the black students routinely studied alone. They rarely had their ideas challenged by peers; they had no way to "check out" their understanding of what was being required of them either by their professors or, more generally, by the University.

*(continued on page 4)*



# CULTURAL CONTEXT

## COMPONENTS & FUNCTIONAL LEVELS

### 1. INTERACTION

⇒ Micro level – Individual or workplace/classroom

### 2. ASSOCIATION

⇒ Workplace, campus, community

### 3. TEMPORALITY

⇒ Time orientation

### 4. TERRITORIALITY

⇒ Use of space & Place

### 5. INFORMATION

⇒ Networks, information flow & cognition

### 6. GENDER/ CULTURE

⇒ Gender orientation

### 7. LEARNING

⇒ Learning styles & cognition

### 8. ACADEMIC SYSTEMS

⇒ Macro level - Institutional level characteristics (predominantly Low Context)

# LOW CONTEXT

# HIGH CONTEXT

## MULTICONTEXT



INTERACTION

INTERACTION

Emphasis on words to supply meaning & low use of non - verbal signals

High use of non - verbal signals with words to contextualize meaning.

---

Communication is direct

---

Communication is indirect

---

Disagreement is depersonalized

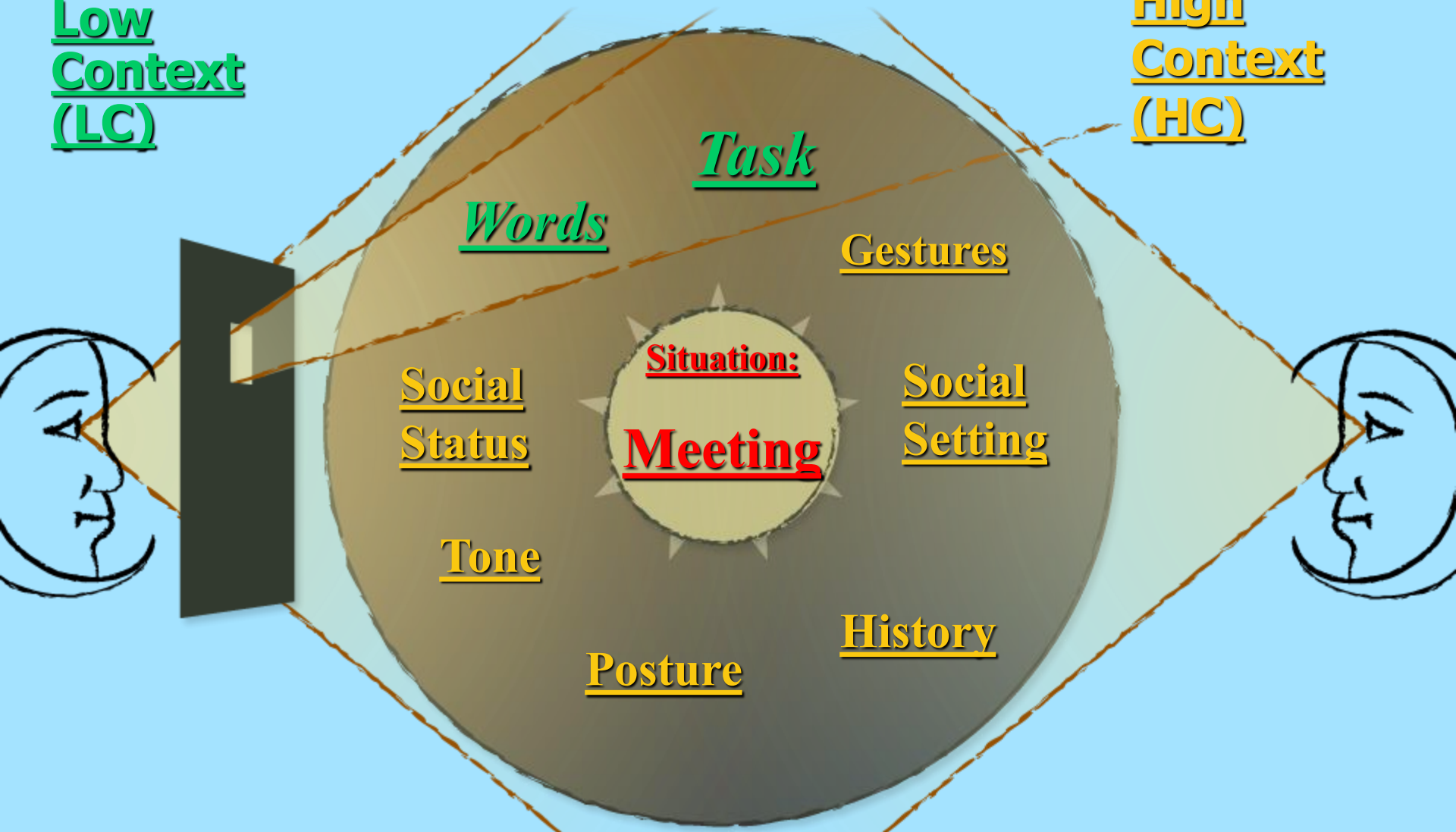
---

Disagreement is personalized



Low  
Context  
(LC)

High  
Context  
(HC)



## High and Low Context Communication

Edward T. Hall- Beyond Culture / Dance of Time



# CONTRASTS BETWEEN LOW CONTEXT (LC) AND HIGH CONTEXT (HC) ACADEMIC CULTURES

[GARY WEISSMANN AND IBARRA]

Low Context, Individuated Learning	High Context, Integrated Learning
<u>Information or data</u> may be separated from context (e.g., study something in isolation of other possible interacting factors). A STEM example of this is math worksheets, where the problems are out of context of any real-world application.	<u>Information or data</u> must be evaluated in context with possible interacting factors, and information out of that context is meaningless. Systems science is usually contexted, focusing on relationships among objects.
<u>Examination of ideas</u> is valued rather than broad comprehension of real world applications, thus theoretical STEM disciplines are often considered to be more important than local case studies.	<u>Application of knowledge</u> in real-world events (social skills) is most valued. Interconnected thinking fosters broad comprehension of multilayered events. Understanding of science through applied case studies developed in a community setting is valued.
<u>Linear thinking</u> is most valued, and publications in STEM fields follow linear logic.	<u>Non-linear, relational thinking</u> is most valued and is often relayed in a story-telling sense.
<u>Interactions</u> use direct communication, where facts and concepts are unembellished.	<u>Interactions</u> use indirect communication, where facts and concepts are embellished with stories.
<u>Task oriented</u> , where success is evaluated by how the task was completed.	<u>Process oriented</u> , where success is evaluated by how cohesively the group conducted the work.
<u>Time</u> is perceived as a commodity, where it is “spent, wasted, or saved.” Emphasis on schedules, compartmentalization, and promptness.	<u>Time</u> is a process in nature, and things are completed in as much time as is necessary and may not fit into a specific schedule.
<u>Space</u> - personal property is shared less	<u>Space</u> - personal property is shared more
<u>Academic teaching style is technical</u> - style is individual, less interactive, and teacher oriented. Research interests include people or communities, but they focus on theoretical and philosophical problems. Writing style uses fewer pronouns.	<u>Academic teaching style is personal</u> - style is more open, interactive, and student oriented. Research interests are directed to real-life problems with people and the community. Writing style tends toward more use of personal pronouns.

# CONTEXT DIVERSITY (CD)

The 1990's study revealed that our long-standing issues about diversity in education is closely tied to the cultural context of our institutions of higher education.

The contextual dissonance (LC vs. HC) impacts all groups and individuals including majority males. Because URM's have more adverse impact on their academic performance, we ignore the "hidden dimension" of cultural context on other populations.

Thus, we must strive to create a balance in the contextual elements of our institutions through initiatives and models of Context Diversity.

# CONTEXT DIVERSITY

## HELPING THE SYSTEM ADJUST TO PEOPLE

- ❖ It is an emerging transformative paradigm that emphasizes reframing rather than reforming organizational cultures to meet the needs of all populations and especially underrepresented groups.
- ❖ The dynamic effect is to create a community with myriad ways to attract diverse populations and have them thrive in an academic or workplace environment.

# CONTEXT DIVERSITY

- ❖ Is associated with systemic change in the core organizational cultures not just programmatic change.
- ❖ It shifts diversity initiatives from current concepts about recruitment and retention to concepts that emphasize attracting and thriving (“People want to be here.”) or reframing rather than reforming

# CONTEXT DIVERSITY

- ❖ It also shifts the focus from people as the source of conflict to the institutional and organizational cultures as the source of conflict.
- ❖ It should not be associated with concepts of institutional racism, which are often policies used by dominant groups to subjugate subordinate groups.

# CONTEXT DIVERSITY

Results are measured not only by how well we attract diverse populations, but also by how well we enhance our campus climate and cultures to improve upon the academic and work performance among all students, faculty and staff.

- ❖ Objective: *build diversity into the context of our higher education system, our learning communities and beyond.*

# **ACCELERATE MATH EXPERIENCE PROGRAM**

## **2013-2015**

### **STUDENT LEARNING OUTCOMES & CONTEXT DIVERSITY**

**Mario A. Rivera, Ph.D., Lead Evaluator**

**Michael Howland-Davis, MPA, Co-Evaluator**



**Accelerate Math Experience** is a program of *Accelerate New Mexico* carried out in six college campuses in northern New Mexico. In its fourth year of operation as a Rural Development Corp. (RDC) project funded by the Department of Energy, it enrolls predominantly non-traditional and URM undergraduate students.

## Three-Pronged Approach

Low Context  
Computer  
Learning - ALEKS



Multicontextual  
classroom  
sessions



High Context  
application –  
program robots





# MATHEMATICS CONTENT MASTERY PRE- AND POST-TEST

▶ AVG

AVG.

▶ 2015: Pre-test = 21% Post-test = 70% Pass rate = 96%

▶ 2014: Pre-test = 14% Post-test = 70% Pass rate = 84%

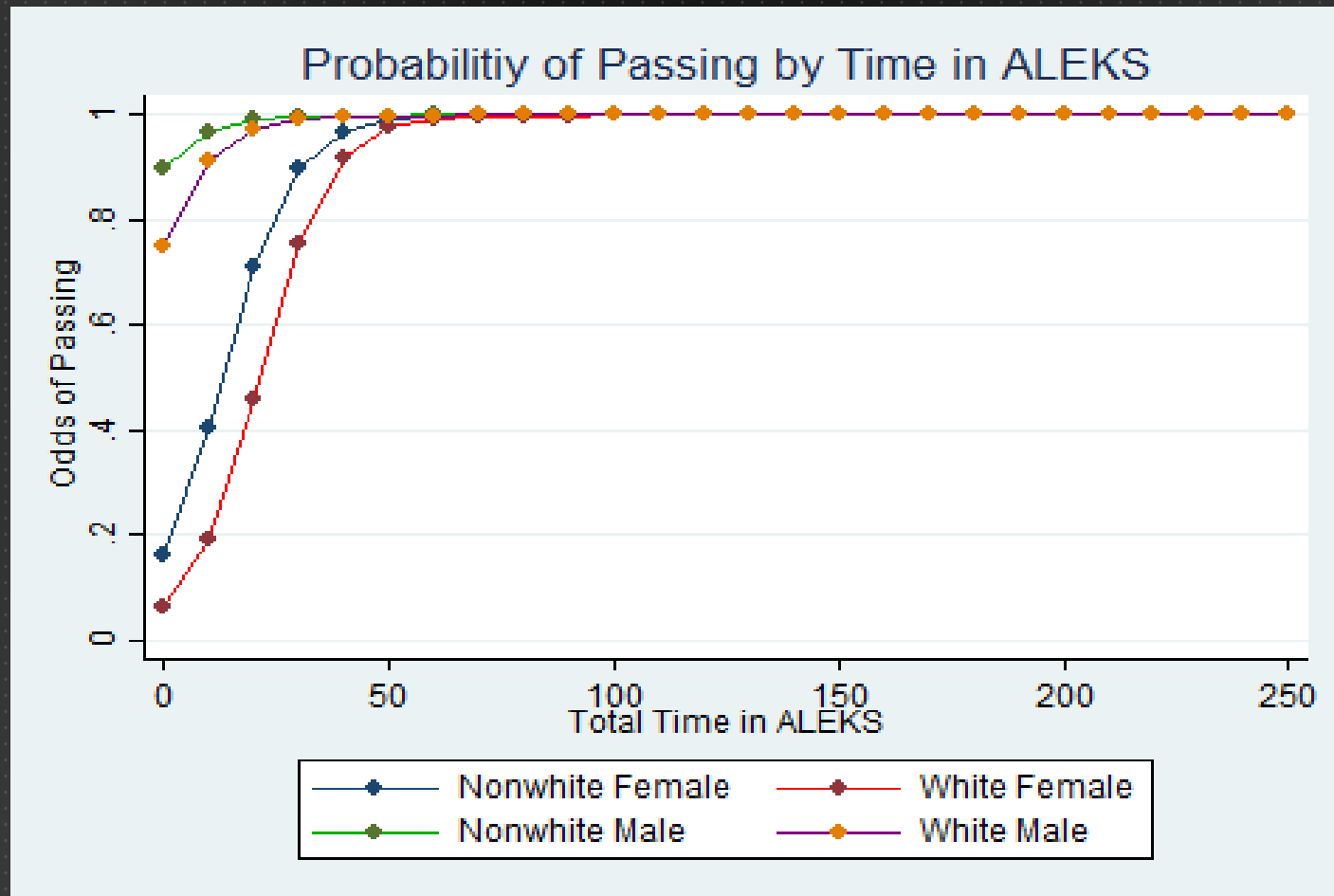
▶ 2013: Pre-test = 22% Post-test = 70% Pass rate = 82%

▶ Students enter the program with similarly low levels of content mastery, and complete at an extraordinarily high pass rate.

▶ In 2015, more than 2/3rds of the students earned A's or B's.

# ACHIEVEMENTS

- In 2014 Accelerate NM Instructors Closed the Gender/Racial-Ethnic Achievement Gap within Mathematics in roughly 50 Hours Time in ALEKS



# CONTEXT DIVERSITY AND STUDENT LEARNING OUTCOMES (SLOs)

- ▶ URM students were 3 times more likely to pass their math courses than their majority counterparts
- ▶ Context Diversity was found to have a very substantive effect on whether students passed/completed the *Math Experience*
  - ▶ Students with mid-range context diversity scores were three\* times more likely to pass than student with very high or very low scores.
  - ▶ Instructor context diversity scores were just as important predictors as student context diversity scores—in some models they were more important.

\*In some models students with mid-range context diversity were thousands of times more likely to pass.

# CONCLUSIONS

- ❖ **Multicontext Theory** can explain the origin and nature of the academic achievement gap.
- ❖ With training and proper application, **Context Diversity** initiatives show evidence of substantially reducing and, perhaps, eliminating the academic achievement gap under certain circumstances.
- ❖ Thus, **Multicontextuality** is a unique paradigm that has the potential to resolve many of the diversity conundrums that continue to plague our educational institutions.